

# PCB and the Paper Industry— A Progress Report

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The paper industry's experiences with PCBs were chronologically reviewed at a recent "PCB Workshop" sponsored by the Grocery Manufacturers of America, Inc. (1). This history goes back somewhat over a year, at which time two paperboard manufacturers were apprised of the presence of PCBs in folding cartons for packaging dried fruit.

These two manufacturers immediately began searching for the source of the PCB contamination, screening all converting materials used in making cartons from the paperboard. These materials, including printing inks, varnishes and adhesives, proved not to be the source of the contamination. Examination of the fibrous materials used in the paperboard showed the source of PCB contamination to be some of the paperstocks used in manufacturing the paperboard. Certain high quality white and colored paperstock grades, such as ledger papers, were found to contain carbonless carbon papers which were the source of the PCBs.

PCBs at that time were used as one component of the dye carrier in the carbonless carbon paper system.

The American Paper Institute, the industry association, alerted the paper industry to this source of PCB contamination. Combination paperboard manufacturers, those who use recycled fibers in paperboard manufacture, immediately adopted operating procedures to eliminate the use of carbonless carbon papers and thus to minimize the PCBs in the paperboard.

This action unquestionably was essential. Yet, in one respect, it does run counter to the national interest and the goals of the solid waste program

of the Environmental Protection Agency. The combination paperboard industry now uses 70% of all paper that is recycled in the United States. Additionally, the paper industry is being implored by government agencies to recycle more waste-paper in order to help combat our mounting solid waste problem.

Continuing research by the industry also showed that virgin fiber grades of paper and paperboard sometimes contained measurable amounts of PCBs, even though no carbonless carbon papers were used in their manufacture. Since PCBs have been established to be widespread in both our air and water environment (2, 3, 4, 5), the presence of PCBs in virgin fiber products is felt to be a reflection of these background environmental levels.

The Monsanto Company, sole domestic manufacturer of PCBs, withdrew PCBs from sale for other than closed system applications as of September 1, 1970. The manufacturers of carbonless carbon papers discontinued the use of PCBs in their product on June 1, 1971. These actions, together with the paper industry's elimination of carbonless carbon papers from paperboards used for food packaging, have resulted in marked reductions in the levels of PCBs in combination paperboard. They are also expected to show decreasing environmental or background PCB levels in the future.

Under the sponsorship of The American Paper Institute (A.P.I.), research is currently in progress at Hazleton Laboratories, Inc. to study the mechanism by which PCBs migrate from paperboard to various food products and, also, to survey the levels of PCBs in United States pulps, papers and paperboards.

The former study is only well begun so I am

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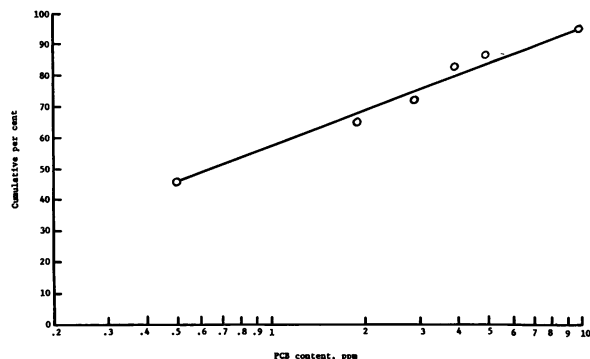


FIGURE 1. Cumulative-distribution of PCB in 676 samples of paper and paperboard.

unable to present any meaningful data on migration to you at this time. The survey study is progressing smoothly, however, with approximately 676 samples having been analyzed to date. The results of these analyses are shown as a cumulative-distribution in Fig. 1. They have not yet been classified according to paper or paperboard type, so represent a broad spectrum of virgin and reclaimed paper and paperboard materials. This cumulative distribution shows 94% of all the samples to have PCB contents less than 10 ppm; 86% less than 5 ppm; and 46% less than 0.5 ppm (not detectable).

A second survey study is being sponsored by the Boxboard Research and Development Associ-

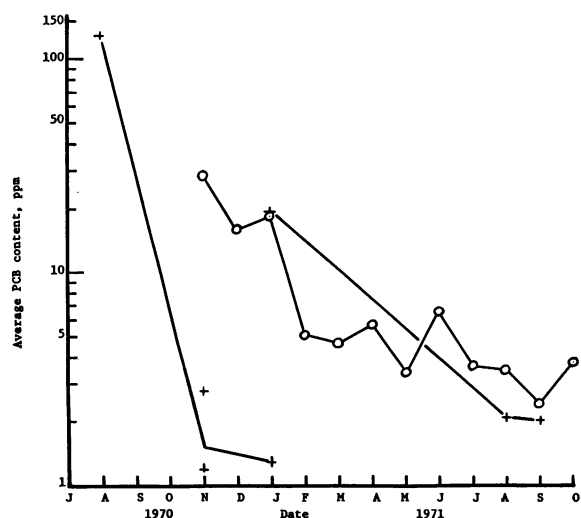


FIGURE 2. Effect of furnish control on PCB content of combination paperboard.

Table 1. Estimated PCB content of typical packaged foods.

Product	Product weight, oz.	Carton: product ratio	Calculated ppm PCB in food product for 33% transfer from cartons containing	
			5 ppm	10 ppm
Rice	42	0.048	0.08	0.16
	28	0.045	0.07	0.14
	14	0.053	0.09	0.17
Uncooked cereal	22	0.07	0.11	0.22
	11	0.096	0.16	0.32
Candy gum drops	6	0.08	0.13	0.26
Spaghetti	48	0.056	0.09	0.18
	16	0.06	0.10	0.20
	6	0.136	0.22	0.45
Raisins	15	0.052	0.09	0.17
	1.5	0.13	0.22	0.44

ation at The Institute of Paper Chemistry. This study is concerned only with recycled fiber paperboards. Preliminary data from this study indicate a mean PCB value of 3.6 ppm and an average PCB value of 6.4 ppm.

That the prompt action of the paper industry has indeed been effective in reducing PCB levels in food packaging materials can be seen from Fig. 2. Figure 2 depicts the change in PCB content with time for several grades of recycled fiber paperboard, where sufficient data were available to permit reconstruction of such a history. Similar histories could be developed for other food-packaging grades. This however would not add materially to our understanding of the problem more than is already seen from Fig. 2.

Although we do not yet have the results of the A.P.I. migration study, preliminary research by one A.P.I. member indicates that PCB migration from paperboard to high fat-content products does not exceed 33% of the total PCB in the paperboard, even in the absence of any protective barrier between the paperboard and the product. Based on this 33% migration factor and PCB levels of 5 to 10 ppm as being common in paper and paperboard, we can estimate expected levels of PCBs in products packaged directly therein.

Such calculations are shown in Table 1 for typical foods now packaged in paperboard cartons. Since, in most instances, the ratio of carton weight to product weight is normally of the order of 1 to 20, PCB levels in food products on the market today would be expected to be generally well below one-half ppm.

This expectation is in reasonable agreement with the preliminary results of the Food and Drug Administration food survey presented by Dr. V. O. Wodicka at the previously mentioned workshop (1). With one exception (0.6 ppm), the mean values of PCBs in fifteen food commodities ranged from 0.005 ppm to 0.4 ppm.

These preliminary data indicate that PCB levels in currently manufactured paper and paperboard

food packaging materials are not such as to represent a hazard to public health. These present levels are expected to decrease further as corrective actions, that have been taken by the industries involved, become fully effective.

#### REFERENCES

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